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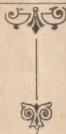
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EXCISION OF TUBERCULAR KNEE JOINT.

A CASE OF INCIPIENT HIP-JOINT DISEASE.*

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Gentlemen:—The first case I bring before you to-day is a woman, 25 years of age, who says that nineteen years ago, or when she was six years of age, some trouble of the knee-joint began, although the nature of this trouble she is unable to tell. For twelve years past, the knee has been more or less bent, gradually increasing, and during the last two years it has become more and more so, until now it is in a right angled position. For a time she walked upon her leg by using a high sole, but for the past two years she has not been able to walk upon it at all. One year ago a sinus appeared on the outside of the knee, and a discharge began which has continued up to the present time.

It is of interest to get at the pathological condition which may have caused an injury of this kind, and to that end, inquiry has elicited the following: Her father died of phthisis; four sisters and two brothers died in infancy from conditions which would indicate inherited tubercular diathesis. Here is sufficient history of tuberculosis to give a diagnosis. The case is of special interest because it shows the character of the disease—how it may run for years without the formation of sinuses. The chronic character of this tubercular bone affection must be impressed upon you that you may know the long, tedious character of the treatment required to secure a good result. In these cases, we are able generally to secure a history of tubercular disease of the hard or soft tissues in parents or families, and it generally means a less favorable subject for operation. In this case we expect to do enough to thoroughly eradicate the local diseased tissue. I would like you to notice the backward dislocation of the tibia, the prominence of the condyles, and the position of the sinuses. Is it possible by means of forcible straightening to correct this deformity after simple division of the tendons? If this is possible, what shall we do with the foci of the disease? If we simply divide the contracted soft tissues and attempt to gouge out the carious mass by enlarging the opening, we would not get a good result, as we could not reach all the disease, and the mere removal of a part only, would not be efficacious. Excision of the joint is the proper method of procedure, with removal of all the necrosed tissue, so that ossific union may result. How, now, shall we proceed with the excision? The methods, ordinarily resorted to, are three principally: The *first* is to take the condyles as the beginning and ending point of the incision, and then, by one of two methods, have the incision connected with these two points. Either let the line of incision pass directly across the center of the patella, or let it pass by a circular line, the lowest point of which is at the middle of the ligament of the patella. In either of these incisions you are enabled to retract the flap sufficiently to see, and remove, the necrosed tissue,

*Clinical Lecture delivered at the Jefferson Medical College Hospital.

To avoid the occurrence of posterior displacement of the tibia it is recommended that a direct vertical incision be made over the patella which may be extended through the patella by means of a saw, and through the quadriceps muscle, there exposing the condyles which may be removed. A point in favor of this vertical method is that it is a very rare thing to have bony union in transverse fracture of the patella, and hence by this operation, which results in a vertical fracture of the patella, the bony union is facilitated. The obstacles to bony union of transverse fracture of the patella are, first, the entrance of the synovial fluids between the fragments; second, the difficulty of keeping absolute coaptation of the fragments, and third, the rupture of the nutrient artery of the patella, and thereby diminishing the nutrition of the patella. If the patella can be so divided that bony union will take place, we then have a strong anterior splint to prevent the posterior dislocation, to which I have already referred.

Here is a pathological specimen of a right-angled ankylosis of the knee-joint, and you will observe that the patella is firmly united by ossific deposit, and that the vertical incision would not only not facilitate, but would add greatly to the difficulty of the operation in such a case. Hence, at times, it becomes necessary to resort to other modes of incision. If our case had the extensive lesions found in this specimen, a large mass of tissue would have to be removed in order to excise all unhealthy structures. By means of this articulated knee, I want to show you one or two important points in excision of the knee-joint. After dividing the soft tissues, we proceed to saw off the diseased bony tissue. If this is done by the ordinary butcher's saw, at a right angle to the center line of the femur, we will produce a deformity by the obliquity of the point of contact of the femur and tibia. We must make our incision with the saw, in a line parallel to the articulation, and at a right angle to a line drawn from the center of the ankle joint, to the center of the head of the femur, and not at right angles to the femur. If we cut from without, inward, there is a possibility that the popliteal space may be invaded, with the risk of injuring the popliteal vessels. This may be avoided by means of a rubber or tin plate, which can be slipped under the condyles. I prefer hard rubber for the reason that when it is put into hot water, it becomes malleable and can be readily curved to suit the case and passed under the condyles. Now, in removing the diseased head of the tibia, the same precautions must be taken to prevent a crooked leg resulting.

Then the question arises, "How shall we hold the excised ends of the femur and tibia together?" Various methods have been resorted to, as suturing with cat-gut through holes bored through the ends of the bones. The objection to cat-gut is, that it is apt to yield too soon. One of the methods employed in this hospital is the insertion of nails, which are driven into the cancellous structure of the bone, thus holding the bones fixed in a proper position. They are perfectly innocuous if they are rendered aseptic before using, and they may be removed by a rotary movement, five or six weeks after the operation. The use of wire has been recommended, and may be used by means of small nails which are placed in the ends of the bones, copper or silver wire being wrapped around them. This method requires a greater incision afterwards in order to withdraw the nails and wire. The use of any internal method of maintaining coaptation may be dispensed with, when a properly constructed splint is employed, and as there is less danger of inflammation, reliance should be had upon the splint. Esmarch's bandage has been employed in order to secure a bloodless operation, and it renders the operation

field very clean and facilitates the finding of the nidus of the disease, but secondary hæmorrhage is apt to follow, or at least a considerable amount of oozing, whereas, if we proceed without the Esmarch's bandage and control hæmorrhage with hæmostats, and ligate all bleeding points, we have almost as dry an operation and as good a result, without the possibility of secondary bleeding. The use of the Esmarch's bandage makes it possible to work more rapidly at the time of the operation, but we lose time afterwards. Where the Esmarch's bandage is not used, it is possible to close the wound aseptically and leave it undisturbed for a period of four to six weeks; this is rarely possible when Esmarch's bandages has been employed. The usual results of excision of the knee-joint are, no rise of temperature and no dressing required from four to six weeks. Then comes the most critical point in the treatment of the case. The union of the parts is not always as firm as after fracture, and if the patient be allowed to use the limb, the parts are apt to become distorted. If the patient be kept on the back longer than this, and then be put on crutches for six or eight weeks more, a more perfect result will be obtained. There is one other method I wish to speak of and this is not applicable to this case, although it is frequently employed where there is no caries of the bone. It consists in abrasion of the joint surfaces. After exposure of the joint, all of the cartilage and articular surfaces are abraded by the back or handle of the knife, and put to rest in the extended position and there results ankylosis without shortening. It is not applicable here because a considerable amount of necrosed tissue must be removed. The plan of procedure I shall adopt in this case, is the circular flap, starting the incision at the sinus over the external condyle, sweeping the knife downward through the middle of the ligamentum patellæ and carrying it around to the inner condyle. Dissecting up this flap, I can now proceed to divide the ligament of the patella and now find that the patella is ankylosed in between the condyles, necessitating the use of the chisel to cut it loose. By the use of the saw, I am able to remove all of the necrosed tissue from the head of the tibia and, likewise, from the end of the femur, without removing too much material. Extending the leg, I now adjust it to its future position and find that the lines of incision were correctly made for co-aptation is accomplished in a correct position. The caries of the patella has been so extensive that I deem its removal essential, and shall proceed to cut out the entire tract of the former sinus. I shall use four steel nails, three inches long to maintain co-aptation. Rubber drainage for twenty-four hours will be employed and removed at the next dressing. The skin wound will be held in contact, with silk worm gut, and apply the usual aseptic dressing. The form of splint to be used in this case, will be an impromptu one made of plaster of Paris and two bent iron bars, and possesses the advantage of rigidly maintaining the proper position and facilitating the removal of drainage and re-dressing. The first step is to apply the plaster of Paris bandage from, and embracing the foot, to a few inches below our incision, and another one from just above the knee, embracing the thigh and extending on the outside, above the hip. As soon as these are firmly set, I adjust the lateral iron bars to fit, and they are as you see, bent out so as to leave ample room around the knee. While an assistant holds these two lateral bars in the proper position, and another holds the leg in the position that we wish to have it remain, I will apply a plaster of Paris bandage covering the ends of the bars, and thus make a splint well adapted to the case.

A CASE OF INCIPIENT HIP-JOINT DISEASE.

I bring before you a little girl, aged 7 years, that will illustrate the manner of making a diagnosis of hip disease, and I wish to impress every motion upon you, for the diagnosis will be made, almost entirely, by watching for defective movements. The child gives very meagre history, and in its very vagueness, you will observe the necessity of carefully studying the most minute details. No one symptom or sign can be considered pathognomonic, but it is the association of groups that we are able to decide what conditions are present, and therefore what form of treatment is applicable. During the past two weeks the mother says there has been some limping but the child has never complained of pain. She does not always limp, but it is more apparent after she has become fatigued from walking. Sleep is not much disturbed; she does not appear to be any more restless than the other children in the same family. She has always been a fairly healthy child, having had the measles but no other diseases of childhood. Upon close inquiry, I have learned that the family has a history of phthisis upon the mother's side, an aunt and uncle of the patient having died of phthisis. The only symptom of any kind that can be obtained, is the occasional limping when the child is fatigued, and with that one symptom, it will be necessary to subject the case to that critical inspection, always to be observed in the diagnosis of any supposed tubercular joint disease. There is no certainty that a joint disease is present, for the limping may be accounted for, by a short leg, by muscular atrophy or by a sprain, reflex irritation or spondylitis. But the family history naturally attracts our attention to the joints, and as you perceive, there is as yet nothing to attract our attention to any of the joints. The beginning of these affections are not heralded with gross manifestations of severe pain, immediate deformity, inability to use the parts, but the invasion is most insidious and, therefore, considerable discernment is necessary to locate the lesion in its incipency. One of the points I want you to observe is the possibility of making an accurate diagnosis almost without touching the patient. This is accomplished by asking the patient to assume those positions which will manifest any departure from the normal mechanical functions of the joints. The patient being nude is now requested to walk about, to stoop, to sit down, and you observe a normal freedom of action of the vertebral column, so that we may safely exclude that from our further consideration. The limp is not that which is associated with acute pain, nor is it apparently due to soreness, but is the kind of limp dependent upon restriction to motion. In walking, the weight of the body rests upon the left foot for a preceptibly shorter time than upon the right, the steps are not even or regular, but it is one long and then one short step, the left side being less used than the right. We have now located the lesion of whatever character it may prove to be, to be upon the left side, and placing the patient upon a bed, we will proceed to criticise the motions of the ankle joint and then the knee and finally the hip. The child produces perfectly free movements of the ankle flexion, extension, the normal amount of rotation, and the lateral movements are unimpaired. The patient now being placed so that both legs may be flexed over the edge of the bed, she is requested to extend the leg of the right side and then of the left fully. This she does with ease, and following it with extreme flexion demonstrating an absence of any restraint. The knee being a simple ginglymoid joint it is very easy to discover any loss of function, but not so with the complicated ball and socket joint of the hip to which your attention must now be

directed. There is nothing apparent, on inspection, save that the superficial veins on the left side are somewhat engorged and swollen. The left leg, you will bear in mind, is the one affected, but I start with the other side, in order to accustom the child to the motions and manipulations to which she will be subjected, and as well that a comparison may be made between the sound and the affected leg. The child is now requested to draw up the right leg, so that she can touch her knee on her chin, without using her hands to assist the movement of the leg, and you see that there is a free motion on this side.

Repeating now the same procedure on the left side, it is clearly manifest that there is marked difficulty in flexion, and that this is made still more apparent when the child attempts to flex both legs at the same time.

To examine extension, it is essential that the patient should be placed upon an even surface, like this operating table which is covered only with a blanket, for the depression of the body in a bed would prevent you from observing, or even obtaining, the full extension that you seek. The position that the child selects is slight flexion of the left hip and full extension of the right, and in this position, the lumbar vertebræ touch the table, which you observe arch sufficiently to enable me to pass my hand, when the left leg is fully extended. With both legs apparently fully extended, you will observe the same thing which is due to restraint to full extension of the hip joint and to the tilting up of the pelvis made possible by the compensatory joint formed by the lumbar spine. So now we have evidence of impaired flexion, and impaired extension.

To properly observe abduction and adduction, it is necessary to have the patient place her heel upon your hand and then to thoroughly relax all her muscles, permitting you to gently abduct and adduct. This being done like the previous movements upon the right side first, the full confidence of the child is obtained. The indicators to be watched are the anterior superior spinous process of the ilium of the opposite side as an indicator of gross movements, and the genitalia upon the same side, as the movements are made, as a finer test. Thus in abduction and adduction you observe that these indicators move in the same direction as the affected leg, which was not the case when the right leg was being observed. This means that there is impaired abduction and impaired adduction, and when the full limit of motion is reached, that is possible in the hip joint, then the supplemental joint, formed by the lumbar vertebræ again comes into play, and enables the pelvis to move in the same direction as the affected leg.

Let us see now how far there is restriction to rotation, to accomplish which, the child will be requested, while upon her back, to put the right leg into the shoe and stocking position, with the external malleolus of the right leg on the patella of the opposite side and to depress the right knee. This movement requires extensive rotation for its accomplishment, and she accomplishes it with utmost ease, but how impossible it is for her to do the same thing with the left leg. She can, after a fashion, put her left external malleolus upon the right knee but it is done by adducting the right knee, and even then she cannot depress the left knee because of an absence of rotation in the acetabulum. Now we have imperfect rotation added to the other evidence of impaired mechanical function. Much can be learned from observing the manner in which she turns herself, for she guards the affected side with an instinctive care that tells its own story. There is a great deal too much importance attached

to the iliofemoral crease as a diagnostic factor. It depends upon mechanical conditions which are easily diagnosticated, and I rarely find it of any use because having found those conditions which produce the changes in it, I require no further proof. On the left side it is slightly diminished, and yet, were you to take that as an evidence of disease, you would be deceived, since it is entirely due, in this instance, to the position of the child. Now as she lies flat upon her face, the crease is slightly increased. If this child were to make strong efforts of the gluteal muscles on this side, it would efface the crease; it therefore depends upon the mechanical condition of the joint, and not so much on an inflammatory condition. As she moves over to her back again, she again guards the left leg with great care, confirming the observations already made.

A method too frequently resorted to, in making a diagnosis, is to pound upon the heel while the affected leg is extended, or upon the flexed knee, which, if followed by a shriek of agony, is considered confirmation. I cannot too strongly deprecate the resort to such a brutal method of procedure, for it is of absolutely no value further than to demonstrate that the child may be forced to experience pain, by inflicting traumatism upon a joint already inflamed. If you apply your skill, you may easily discern the presence of inflammatory processes and finding this, you will know that there must be pain as an associate but you need not resort to force to prove it, especially in view of the fact that the application of such force is productive of more damage to a tubercular joint, than can be overcome in months of most carefully applied treatment. It would be just as scientific, just as practical, just as rational and of equal value, to punch the abdomen of a case of peritonitis and blandly ask, does it hurt? These incipient tubercular joint diseases may go on for some time without manifesting other symptoms than that found in this patient, and is illustrative of slow action. Again in some instances, the progress is very rapid, proceeding often from a blow or a fall, to rapid disintegration and abscess, clearly indicating the necessity of early immobilization and freedom from injury.

Now I shall measure from the points of the anterior superior spinous processes, with the child lying in a straight position on its back, in order to observe the presence or absence of inequality in the length of the legs. Let me show you how to avoid errors in measuring the length of the legs. Taking the tape measure in my hands, I hold my finger of one hand at a fixed point at the inner malleolus, I can allow my finger of the other hand to slide over the anterior superior spine while still on a fixed point on the skin, and thus apparently increase the length of the limb one inch. This is one of the sources of error in taking measurements, and to illustrate its inaccuracy, I find the affected leg apparently one inch longer than the sound one, while there is absolutely no difference. Let us now group what we have, and endeavor to not only locate the lesion but to decide as to its character. Until this has been accomplished, a consideration of the treatment would be futile for we would not know for what condition the treatment should be applied. The child has limped for two weeks, has had no pain, sleeps fairly well, is not restless. All the joints in the body are normal in their action except the left hip joint, which has limited flexion, extension, and an almost entire absence of rotation. A point has now been reached when a positive decision must be reached, and upon this decision will depend the future of the case. Shall the hip be immobilized or attempts made to increase the motion? There is abundant evidence of the presence of ostitis to form an accurate diagnosis of incipient hip joint disease and the very clear indica-

tions are to put the affected part at rest at once. To accomplish this, the child will be placed in bed with extension of one pound applied to the leg by means of adhesive plaster, sand bags reaching from axillæ to feet will be applied upon each side of the patient. Let me urge you to insist upon *contionuous* immobility and that the good accomplished by it is not counter balanced by use, on the part of the patient or by the nurse, when the bed pan is used. The nurse plays a most important part in the treatment, for she can easily spoil all that has been done, by permitting motion of the hip, or when making the bed or washing the patient. Absolute and continuous immobility is required, and unless this is accomplished, there is no necessity of keeping the child in bed, it might just as well run about. In fact the inefficiency of the bed treatment not only brings reproach upon the method, but tends to a postponement of operative procedure having for its object, the removal of the carious points.

This is just the stage of the disease that you want your cases to come under treatment, in order to have the best results. If this limb is restricted in its motion, you will have a good limb result, without any permanent restriction of motion. The temperature of the child at present, in the mouth, is 98.3-5, not indicative of any fever. The essential points in this case are, *first*, the extreme difficulty with which we make a diagnosis in the early incipient stage; *second*, the disease is an insidious one and advances by slow stages, and if we get at the cases later than this, the treatment will not be so satisfactory. Compare the two cases of tubercular bone disease seen to-day, one coming eighteen years after the beginning of the disease, with sinus formed and discharging, and the other in the first stage of the disease; the one comes for a correction of a deformity; the other, for the prevention of a deformity that will inevitably result if the full importance of the case is not impressed upon us.